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# Sudangrass and Sorghum-Sudangrass Hybrids for Forage



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On January 24, 1978, four USDA agencies—Agricultural Research Service (ARS), Cooperative State Research Service (CSRS), Extension Service (ES), and the National Agricultural Library (NAL)—merged to become a new organization, the Science and Education Administration (SEA), U.S. Department of Agriculture.

This publication was prepared by the Science and Education Administration's Federal Research staff, which was formerly the Agricultural Research Service.

Washington, D.C.

Revised August 1978

## **Sudangrass and Sorghum-Sudangrass Hybrids for Forage**

Sudangrass is an annual warm-season grass that is widely planted in the United States for pasture, green chop, silage, and hay. Where the growing season is long, as many as five cuttings can be obtained in one year.

The importance of sudangrass has increased as a result of sorghum-sudangrass hybrids. Advantages of the hybrids are higher yield of forage and increased vigor. Increased vigor improves the chances of establishing the seedlings, creating an overall resistance to adverse conditions, and contributing to higher yields. In the Gulf Coast States, the hybrids are among the most popular summer annual grazing crops.

Sudangrass requires warm temperatures for good production and, therefore, it is not well adapted to the more northern areas of the United States except as a short-season catch crop. Good crops of hay having a short growing period can be found in areas as far north as Michigan and New York.

In the Rocky Mountain region,

conditions generally are unfavorable for growing sudangrass except in the irrigated valleys. Sudangrass cannot be grown successfully at the higher altitudes because of low temperatures during the summer months.

The upper limits for profitable hay production seem to be 6,000 to 8,000 feet (1,828 to 2,438 m) in New Mexico, Arizona, and southern California; 5,000 to 6,000 feet (1,523 to 1,828 m) in Colorado, Utah, Nevada, and northern California.

Sudangrass does best on a rich loam, but it has been grown successfully on almost every type of soil from heavy clay to light sand. In sandy soil, the yield may be light unless the crops are well fertilized. Cold, wet soils are particularly unsuited for sudangrass, and thorough drainage must be provided for it to grow.

Small amounts of alkali in the soil reduce yields considerably, and large amounts prevent profitable culture. Sudangrass is not especially sensitive to soil acidity. It grows well on soils with a pH as low as 5.5.

## DESCRIPTION

### Sudangrass

In solid stands, sudangrass grows 3 to 5 feet (0.9 to 1.5 m) high and has stems about three-sixteenths inch (0.5 cm) in diameter. However, if grown in rows and cultivated, it reaches a height of 6 to 8 feet (1.8 to 2.4 m). The stems are about one-fourth inch in diameter.

The flowering head of the plant is approximately 15 to 30 inches (38 to 76 cm) and about half as wide. Seeds usually are pale yellow to brown when ripe and smaller in size than those of grain sorghum. The leaves are broad and numerous.

Sudangrass develops only fibrous roots and never becomes a noxious weed. Many stems develop from a single seed when given plenty of space.

### Sorghum-Sudangrass Hybrids

The sorghum-sudangrass hybrids resemble sudangrass in growth. The hybrids, however, are taller, have larger stems and leaves, and give higher yields. Most are hybrids between male sterile grain sorghum lines and sudangrass varieties. Seed size and color will vary depending on the female parent used to make the hybrid.

## VARIETIES

### Sudangrass

The State agricultural experiment stations and the Science and Education Administration have devel-

oped several improved varieties of sudangrass that have greater disease resistance, more leaves, sweeter stems, later maturity, and less prussic acid than common varieties.

Certified seed are available for a number of varieties such as Greenleaf, Piper, Georgia 337, Sweet, Common, Cumberland, Sudan 23, and Wheeler. The most popular varieties are Greenleaf, Piper, and Georgia 337. Before buying sudangrass seed, you should determine the variety best adapted to your locality.

*Greenleaf.*—Greenleaf is a vigorous, leafy variety that produces many juicy stems. Because it matures later than many other varieties, Greenleaf produces high yields under favorable soil and moisture conditions. It is somewhat resistant to leaf blight and anthracnose, but resistant to some bacterial foliage diseases. Greenleaf is best adapted to the central latitude in the Midwest.

*Piper.*—Piper has good vigor, early maturity, pithy stems, a low level of prussic acid, and some resistance to leaf blight and anthracnose. Piper is well adapted to the northern Corn Belt and the Northeast.

*Georgia 337.*—Georgia 337 has a high degree of resistance to various leaf diseases. It has sweet, juicy stalks; wide leaves; and a low prussic-acid content. The grass, which is late maturing, has brown seeds enclosed in tan glumes. Under long-growing seasons, Georgia 337 has higher yields than other sudangrass varieties and good potential for high yields under irrigation. This grass is well adapted to the Southern and South-eastern United States.

## **Sorghum-Sudangrass Hybrids**

Most sorghum-sudangrass hybrids were developed by commercial companies. They vary in yield, prussic-acid content, and growth habit, depending on the particular parents used to make them. Because of their parents, hybrids tend to be coarser than sudangrasses. They can be used effectively for grazing, green crop, and hay. If precautions are taken to avoid prussic-acid poisoning, they can also be used effectively for silage.

Hybrids will outyield sudangrasses when harvested two or three times per season. When hybrids are harvested four or more times per season to simulate grazing conditions, however, tests showed that sudangrasses were equal in yield to that of the hybrids.



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Row of sorghum-grass hybrids.

## **CULTURAL PRACTICES**

### **Soil Preparation**

A firm, well-prepared, moist seedbed is best, although acceptable stands may be established with stubble-planting machinery. After seeding, if the soil is dry or rain is not anticipated before seedling emergence, cultipack the seedbed.

### **Planting Date**

Generally, you should seed sudangrass or the hybrids in late spring when the soil has become warm or about 2 weeks after corn planting time. Early plantings are usually not successful and reduce yield.

In the extreme South, the best seeding time for a pasture or hay

crop is between April 1 and May 1; in the latitude of Oklahoma and Kansas, between May 1 and June 15; and in the latitude of Nebraska and South Dakota, between May 15 and June 15.

In the Northern States, the best seeding time is from June 10 to 25, although seedings may be made as late as July 15. However, planting this late shortens the growing season and may result in low yields because of summer droughts and cool fall temperatures.

You may delay the seeding of a portion of the area intended for pasture or green chop so that production can be spread over a longer period. The delay will aid in the rotation of pastures; with green chop, it will permit harvesting in stages.

## Seeding Rates

The recommended planting rates are 20 to 30 pounds per acre of seed (22 to 35 kg/ha) for broadcast plantings, 10 to 20 pounds per acre (11 to 22 kg/ha) for rows 8 to 20 inches (20 to 51 cm) apart, and 4 to 8 pounds per acre (4 to 9 kg/ha) for rows 36 to 40 inches (91 to 102 cm) apart. Use the lower rates in dry areas and the higher rates for humid and irrigated areas. The amount of seed depends on rainfall, row spacing, and planted use.

Broadcast plantings and close-row spacing, 6 to 8 inches (15 to 20 cm) result in finer and shorter plants which are more desirable for silage and green chop. Where cultivation is possible, wider row spacings, 20 to 36 inches (50 to 90 cm), also result in better regrowth and more uniform production throughout the season. Total forage yield is about the same regardless of row width or planting rate because sudangrass and its hybrids have the ability to tiller. Tillering (production of new stems from the plants) is enhanced when the primary growing point is cut after the first cutting. First-cut yields, however, are usually higher for solid, heavier seeding rates and close-row-spacing plantings because the primary growing point has not been cut.

## Planting Depth

Plant seeds 1 inch (2.54 cm) deep on medium to heavy soils and 1-1/2 inches (3.8 cm) deep on sandy soils.

## Fertilization

The fertilizer requirements of sudangrass are similar to those of other annual grass crops or corn.

Since sudangrass grows rapidly, apply sufficient nitrogen at planting time to insure establishment of the crop and to hasten development. Use 40 to 80 pounds per acre (45 to 90 kg/ha) of nitrogen at seeding time followed by another 50 pounds per acre (56 kg/ha) after the first cut to get maximum production.

Even on the most fertile soils, some nitrogen or a complete fertilizer is frequently advisable. The amount you use will depend on the natural fertility and soil type of the area and soil test recommendations.

You should apply phosphorus and potassium on soils that test low to very low. Use a fertilizer that is best for the production of grass in your area. Adjust rate and time of fertilizer application to moisture supply and forage needs. The use of fertilizer, particularly on sandy soils, needs to be adjusted to rainfall or moisture availability.

## UTILIZATION

### Pasture and Green Chop

Sudangrass and its hybrids are most popularly used as temporary or supplemental summer pasture crops and for green chop. They fill an important need in many regions of the United States because they grow during the summer when other pasture is in short supply or of low quality.

Sudangrass and sorghum-sudangrass hybrids produce an abundance of high-quality forage for both dairy and beef cows and sheep. Many of the varieties and hybrids will produce forage until frost.





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Cows grazing on summer sudangrass hybrids.

To obtain maximum production, the crop should be grazed in rotation with other pastures or divided into subdivisions that are rotated. Sudangrass and sorghum-sudangrass hybrids are usually ready for grazing 5 to 6 weeks after planting. The plants are palatable and readily eaten at the early heading stage, but regrowth will be better when the crop is grazed before heading starts.

To avoid prussic-acid poisoning (see p. 8), sudangrass should not be pastured until it is at least 18 to 24 inches (46 to 61 cm) high. When grazing begins, stock sudangrass heavily so it will be grazed down before heading starts.

For rotating sudangrass pastures, subdivide fields to a size that can be grazed down in about 10 to 14 days. Allow at least 18 inches (46 cm) of regrowth before regrazing. When the crop is handled in this way, the pas-

ture has a carrying capacity per acre of six or more animals for a short period. In addition, plant growth will be young, succulent, and highly nutritious throughout the grazing season.

Livestock will graze selectively and trample the crop when growth reaches 40 inches (102 cm) or more. If the growth in some fields reaches 40 inches before your livestock can graze them, you can harvest these fields for silage or hay.

Sudangrass and sorghum-sudangrass hybrids are ideally suited for green chop. Cut the plants down to a 6-inch (15 cm) stubble. Make the first cut just before the heading stage to insure good regrowth.

## Hay

Highest hay yields are obtained if you harvest the crop when the seed is in the soft-dough stage. Because



curing is difficult at this stage, harvesting is more practical at the vegetative stage before heads are exerted.

Use of hay conditioners will reduce the drying time and give better quality hay. The feed value of good sudangrass hay is about equal to that of millet, timothy, johnsongrass, and other nonlegume forage.

Because of the large amount of juice in the stems of sudangrass, the leaves cure first and the hay often appears ready to be put into storage when it is not.

The leaves keep well, and if the grass is cut at the right stage of maturity and handled properly, it will make a bright, leafy, sweet hay of high quality.

The time of cutting is sometimes governed by the number of cuttings desired. Often, making the first cutting as early as possible may be more profitable so that the grass will tiller and have more time for the second growth.

If you use well-adapted varieties, you can extend the harvest of higher quality forage over a longer period without material loss in quantity or quality of hay from leaf diseases. Where leaf diseases are a problem, frequent harvests are desirable.

## **Silage**

Sudangrass and sorghum-sudangrass hybrids make acceptable silage for beef and dairy cattle. They have about 90 percent of the feed value of corn silage.

Harvest sudangrass and the hybrids at the soft-dough stage for making silage. At this stage wilting the forage or adding a preservative is not necessary, particularly if sweet-type varieties or hybrids are used.

If the crop is planted in rows, harvest it with conventional silage equipment. Wider rows lessen harvesting losses when used for silage. The plants are not likely to lodge and the lower leaves last longer, particularly in 40-inch rows.

## **PRUSSIC-ACID POISONING**

Young plants and leaves of sudangrass and sorghum-sudangrass hybrids contain a chemical that breaks down and is released as a poison known as prussic acid or hydrocyanic acid (HCN). The hybrids, due to the sorghum parent, are often much higher in prussic acid than sudangrass.

Livestock may be poisoned if they eat large amounts of forage with a prussic-acid content above 600 parts per million. To avoid this problem, therefore, you should learn to recognize conditions under which prussic-acid levels may be high in sudangrass or the hybrids.

Danger of poisoning is minimal by the time the grass is 18 to 22 inches (46 to 56 cm) high. The plants have more prussic acid if the soil is high in nitrogen and deficient in phosphorus and potassium.

An increase in prussic-acid content may result when sudangrass is treated with 2,4-D at rates that stunt the crop. The increased prussic-acid level may last several weeks.

Adverse weather conditions such as drought, cold, or frost retard growth and extend the critical period when prussic acid may be present. This period varies for different hybrids and varieties.

Plant tissue killed by freezing contains higher amounts of prussic acid

than plant tissue not damaged by cold. Frost that kills the top growth may not kill lower portions of the plant and new shoots may appear. Cattle grazing such material frequently avoid the frost-damaged top growth and graze the young shoots where prussic acid may have reached toxic levels.

Frosted sudangrass or sorghum-sudangrass hybrids may be used for silage. However, do not feed new silage for 2 to 3 weeks because the delay will allow prussic acid to escape.

Prussic-acid poisoning is more likely to be a problem in Northern States because the period of low temperature is longer than in Southern States.

## **PEST CONTROL**

### **Weeds**

Weeds probably cause the most damage to sudangrass varieties and sorghum-sudangrass hybrids grown for forage. Proper seedbed preparation and periodic cultivations if forage is planted in rows will help control weeds. Broadleafed weeds can also be controlled by applying 1/4 to 1/2 pound per acre (114 to 227 g/ha) of 2,4-D amine in 5 gallons (21 L) or more water. Apply the 2,4-D when the plants are 4 to 8 inches (10 to 20 cm) tall. Other herbicides are registered by the Environmental Protection Agency (EPA) for controlling broadleafed weeds and annual and perennial weeds in sorghum, but some States have special restrictions on the use of certain herbicides. Before applying a herbicide, therefore, check State and local regulations.

### **Diseases**

The leaf blights which cause elongated, straw-colored lesions with reddish margins on leaves are the most serious diseases. Use of resistant varieties is the best control for these diseases. Early and frequent harvesting and rotations with other crops will reduce the outbreak of many leaf diseases.

Downy mildew is another major disease. Plants infected with this disease have yellowish and reddish-deformed leaves. The best control is the use of resistant varieties. Other effective ways of controlling downy mildew are by either removing debris from the field or by plowing the debris completely under.

### **Insects**

Insects are usually not much of a problem on sudangrass and sorghum-sudangrass hybrids. Where isolated problems do exist, consult local pesticide specialists for control recommendations.

## **USE OF PESTICIDES**

This publication is intended for nationwide distribution. Pesticides are registered by the Environmental Protection Agency (EPA) for countrywide use unless otherwise indicated on the label.

The use of pesticides is governed by the provisions of the Federal Insecticide, Fungicide, and Rodenticide Act, as amended. This act is administered by EPA. According to the provisions of the act, "It shall be unlawful for any person to use any registered pesticide in a manner inconsistent with its labeling." (Section 12 (a) (2) (G) )

EPA has interpreted this section of the act to require that the intended use of the pesticide must be on the label of the pesticide being used or covered by a Pesticide Enforcement Policy Statement (PEPS) issued by EPA.

The optimum use of pesticides, both as to rate and frequency, may vary in different sections of the country. Users of this publication may also wish to consult their Cooperative Extension Service, State agricultural experiment stations, or county extension agents for information applicable to their localities.

The pesticides mentioned in this publication are available in several different formulations that contain varying amounts of active ingredient. Because of this difference, the rates given in this publication refer to the amount of active ingredient, unless otherwise indicated. Users are reminded to convert the rate in the publication to the strength of the pes-

ticide actually being used. For example, 1 pound of active ingredient equals 2 pounds of a 50 percent formulation.

The user is cautioned to read and follow all directions and precautions given on the label of the pesticide formulation being used.

Federal and State regulations require registration numbers. Use only pesticides that carry one of these registration numbers.

USDA publications that contain suggestions for the use of pesticides are normally revised at 2-year intervals. If your copy is more than 2 years old, contact your Cooperative Extension Service to determine the latest pesticide recommendations.

The pesticides mentioned in this publication were federally registered for the use indicated as of the issue of this publication. The user is cautioned to determine the directions on the label or labeling prior to use of the pesticide.



*Use Pesticides Safely*

**FOLLOW THE LABEL**

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